

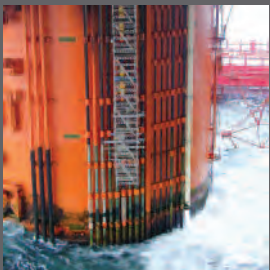
# ContraFlame

An Advanced Insulation Product



## JF120

offshore lightweight fire protection  
and insulation system



Advanced  
INSULATION CONTRACTING

better products for  
challenging situations

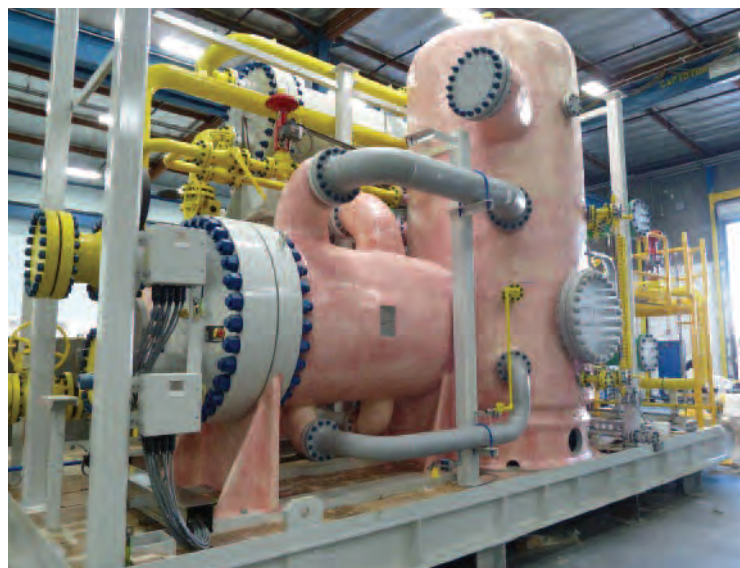
# ContraFlame® JF120 : Multi-functional Composite Insulation System

ContraFlame® JF120 is the latest version of our well proven fire protection and insulation system. This new version is significantly lighter and its thermal conductivity is now comparable with cellular glass or dry Rockwool.

ContraFlame® JF120 is a multifunctional composite system based on unique phenolic syntactic foam and phenolic glass reinforced laminate which combined provide :

- + Jet fire passive fire protection to 120 minutes
- + Hydrocarbon pool fire passive fire protection
- + Thermal Insulation
- + Closed cell structure
- + Tolerance to elevated temperatures (185°C)
- + Tolerance to very low temperatures (-196°C)
- + Robust energy absorbing structure
- + Excellent water resistance
- + Very low smoke and fumes in fire conditions
- + Will not propagate flame
- + Ambient curing

ContraFlame® passive fire protection system is backed by more than ten years of research, testing and field experience. It is a truly passive system not relying on any chemical or physical changes when exposed to fire. As a result, the material has a much wider tolerance to service temperatures than other conventional passive fire protection materials.



The cold curing properties of ContraFlame® JF120 passive fire protection system allows direct application to process pipework and equipment.

## Uses of ContraFlame® JF120

- + Hot risers
- + Hot three phase separators
- + Hot slug catchers
- + Under decks, insulation/protection
- + Top deck protection
- + Flare stacks
- + Steel structures that are subject to thermal shock, e.g. LNG plants
- + Process pipework and equipment

## Resin Base

Phenolic materials are widely used in high temperature applications, such as brake lining and heat shields, and have excellent performance when exposed to fire with regard to both durability and low smoke or toxic fume emissions.

Phenolic resin is the acknowledged first choice resin system for elevated temperature service conditions and therefore Advanced Insulation chose it as the base of the entire ContraFlame® JF120 system.

## Syntactic Phenolic Foam

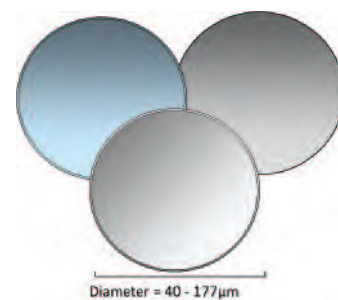
The heart of the new ContraFlame® JF120 system is the improved version of our ContraFlame® C50 cold curing syntactic foam. ContraFlame® C50 has a closed cell structure, so it is highly resistant to water permeation in the event of any accidental damage and exposure. Other advantages include:

- + Low cured density  
270 - 330kgm<sup>-3</sup>
- + Low thermal conductivity  
of 0.05Wm<sup>-1</sup>K<sup>-1</sup> at 25°C
- + Excellent fire stability
- + Wide service temperature range  
from -196°C to 185°C
- + Low water absorption
- + Excellent impact resistance
- + Resistance to extreme thermal  
shock ( $\Delta T = 300^\circ\text{C}$  in 10 minutes)
- + Excellent resistance to  
marine environments

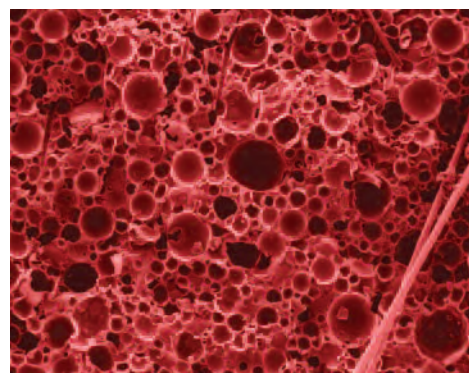
## Phenolic Laminate Topcoat

ContraFlame® JF120 system includes an all-phenolic two part topcoat developed by Advanced Insulation. It comprises 3-5mm of glass reinforced D2004 phenolic resin system. This composite top skin is applied to the surface of the ContraFlame® C50 foam forming an extremely robust outer skin with high resistance to jet fire ablation. The ContraFlame® JF120 system is normally finished with a decorative paint finish.

Both ContraFlame® C50 and D2004 are cold curing systems.

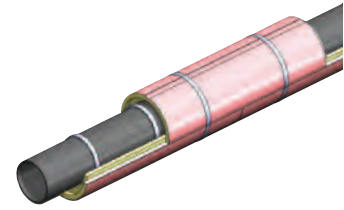


Glass microspheres



Micro photograph of C50 syntactic foam

# ContraFlame® JF120 : Half Shells



## Key Features

- + Closed cell structure, Pre-cast Insulation/Passive Fire Protection (PFP) for pipe work (size 1" - 36") including bends, tees, reducers
- + Rapid, dry installation
- + Demountable and reusable
- + J120 Jet fire approved, blast resistance
- + Superior insulation properties ( $0.05 \text{ Wm}^{-1} \text{ K}^{-1}$ )
- + Wide tolerance to elevated and low service temperatures<sup>1</sup> (+185°C to -196°C)
- + Designed to accommodate heat tracing on pipe work

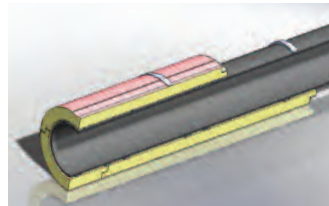


## Material

ContraFlame® a multifunctional composite systems based on unique phenolic syntactic foam and phenolic glass reinforced laminate.

## Construction

- + Pre cast half / tri shell sections with overall thickness of 50mm, comprising of 46mm C50 phenolic foam and 4mm of glass reinforced laminate. Typically supplied in 1 metre lengths
- + Sections assembled in staggered pattern in order to offset joints, sections are sealed with fire rated silicone mastic.
- + The complete assembly is clad with Venture tape® a weather-proof membrane and secured with 316 Stainless steel bands at 250mm centres



## Typical Application

- + Flare Stacks
- + Risers
- + Insulated Pipe works size 1" - 36" with or without heat tracing
- + Pipe work which requires regular inspection
- + Pipe work requiring heat conservation / personal protection

## Design Criteria

- + Pipe work run within high risk area requiring Passive Fire Protection (PFP) to J120 or similar
- + Pipe work which requires blast protection
- + Pipe work which requires durable impact resistance insulation
- + Pipe work which operates at high service temperature
- + Pipe work which operates in environments which are subject to cycles of low / high temperature fluctuations
- + Personnel protection

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# ContraFlame® : JF120 - 200 Riser Protection System



## Key Features

- + Integrated Insulation and Passive Fire Protection to J120
- + High integrity corrosion protection with joint less corrosion barrier suitable for splash and tidal zone
- + Long term resistance to wave action and debris impact
- + Durable Construction to withstand service and environmental conditions
- + Field joint application can be done on site or offshore
- + Ambient Cure, no specialised curing procedures or equipment
- + Low Heat Transfer Coefficient (U-Value) =  $0.91 \text{ Wm}^{-2}\text{K}^{-1}$  at 96mm
- + Wide tolerance to elevated & low service temperatures (+185°C to -196°C)
- + Truly passive fire protection, material does not undergo any chemical change in the course of the fire
- + ContraFlame JF120-200 meets Total Specification GS SAF 337
- + ContraFlame® JF120-200 system carries jet fire certification for use on process equipment, risers and pipework
- + Maximum temperature rise after 2 hour tubular jet fire = 64°C
- + Lloyds certification SAS F060240
- + Tested on riser system with Hp/A up to  $161\text{m}^{-1}$

## Material

ContraFlame® a multifunctional composite systems based on unique phenolic syntactic foam and phenolic glass reinforced laminate.

## Construction

ContraFlame® Tie Coat applied to blasted & corrosion coated substrate.

Primary layer of C50-400 is applied at a thickness of 75mm, and is designed to give the best level of thermal insulation performance. The density is  $400\text{kgm}^{-3}$  and k value is circa  $0.08\text{Wm}^{-1}\text{K}^{-1}$ .

The secondary layer of C50-700 is applied directly over the primary layer at a thickness of 15mm and is designed to give enhanced resistance to jet fire erosion and low water absorption performance. The density of this layer is  $700\text{kgm}^{-3}$  and the k-value is circa  $0.12 \text{ Wm}^{-1}\text{K}^{-1}$ .

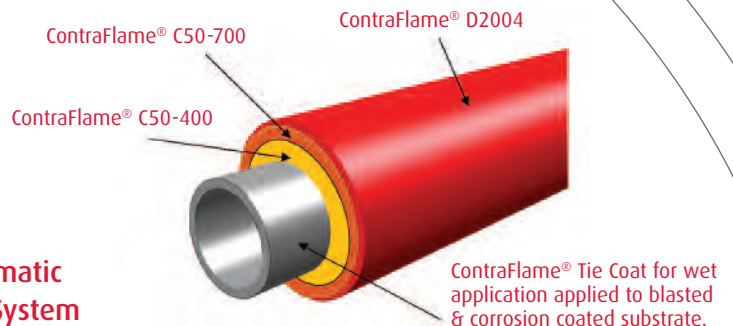
The combination of these layers together with the Duplex steel pipe and 6mm topskin laminate results in an overall system U-Value of  $0.91 \text{ Wm}^{-2}\text{K}^{-1}$  at 96mm total thickness.

## Typical Application

- + Risers
- + Pipework which requires heat conservation and passive fire protection

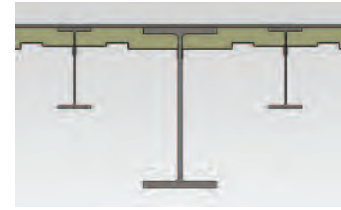
## Design Criteria

- + Offshore risers routing flammable products to and from a facility from below the Lowest Astronomical Tide (LAT)
- + Specification that requires a maximum back face temperature rise of 200°C after 2 hours jet fire



**System schematic  
- JF120-200 System**

# ContraFlame® JF120 : Deck Insulation & Protection



## Key Features

- + Integrated Insulation and Passive Fire Protection to J120 or H rating
- + Provision of bespoke thermal insulation (e.g. control U value) for cellar decks, cantilever decks and associated structural components
- + Durable Construction to withstand service and environmental conditions
- + Complete onsite construction, world wide service including offshore application
- + Ambient cure, no specialised curing procedures or equipment
- + Wide tolerance to elevated and low service temperatures (+185°C to -196°C)
- + Truly passive fire protection, material does not undergo any chemical change in the course of the fire
- + Lloyds certification SAS F100180/M1 structural steel jet fire protection
- + Suitable for close proximity to accommodation blocks due to zero release of smoke and low spread of flame

## Material

ContraFlame® is a multifunctional composite system based on unique phenolic syntactic foam and phenolic glass reinforced laminate.

## Construction

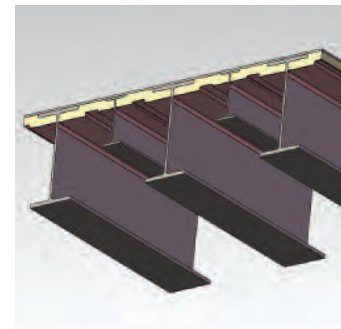
- + ContraFlame® Tie Coat applied to blasted & primed substrate
- + Primary layer of C50 is applied directly against the substrate at the require thickness to achieve the thermal insulation performance
- + Thickness range from 10mm to 90mm. The C50 density will range from 270-330kgm<sup>-3</sup> with the added 4mm D2004 top skin the standard application of 34mm system will weight approximately 15-17kgm<sup>-2</sup>

## Typical Application

- + Cellar decks
- + Cantilever decks
- + Primary & secondary structural elements

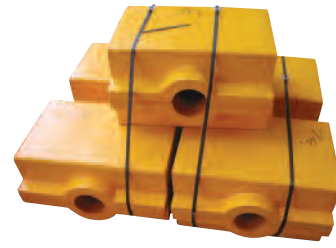
## Design Criteria

- + Offshore platforms which operate in extreme low temperatures
- + Decks in need of thermal insulation and passive fire protection
- + Decks which are exposed to icy conditions and at risk of iceberg impact
- + Decks which require maximum surface temperatures of 400°C during a H rating / J120 event



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# ContraFlame® J60: Enclosures



## Key Features

- + Integrated Insulation and Passive Fire Protection to J60 or H Rating
- + Provision of bespoke Construction / configuration to suit protected element
- + Durable Construction to withstand service and environmental conditions
- + Complete onsite construction, world wide service including offshore application
- + Wide tolerance to elevated and low service temperatures (+185°C to -196°C)
- + Truly passive fire protection, material does not undergo any chemical change in the course of the fire
- + Tested at Spadeadam and verified by 3rd party technical consultancy
- + Self supported and do not require framing (no steel components)
- + Cable and pipe penetration can be installed post construction\*



## Material

ContraFlame® a multifunctional composite systems based on unique phenolic syntactic foam and phenolic glass reinforced laminate.

## Construction

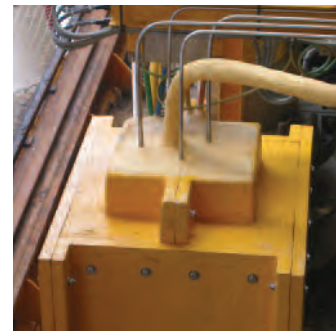
- + Precast self supporting composite panels or two part moulds overall thickness 50mm
- + Internal layer - D2004 a 4mm GRP laminate
- + Core - ContraFlame JF120 C50 foam at 42mm thickness
- + External layer - D2004 a 4mm GRP laminate

## Typical Application

- + Valves bodies
- + Actuators
- + ESDV
- + Flanges (short base / long base)
- + Riser Clamps
- + Pipe supports
- + Fire Pumps

## Design Criteria

- + Mechanical elements which operate within high risk area requiring Passive Fire Protection to J60 or similar
- + Mechanical elements which require blast protection
- + Mechanical elements which require durable impact resistance insulation
- + Mechanical elements which operate in high service temp
- + Mechanical elements which operate in environments which are subject to cycles of low / high temperature fluctuations
- + Mechanical elements which require personnel protection



\* Fire performance might be affected by size, location and percentage of penetration

# ContraFlame® JF120 :

## Designed to Perform in Extreme Conditions

### Corrosion Resistance

Phenolic resins have been used in high performance corrosion resistant coatings for many years. ContraFlame® continues this tradition by displaying exceptional chemical resistance to sea water, oils and solvents as well as acids and other aggressive chemicals.

### Fire Testing

In order to demonstrate the reaction of ContraFlame® systems to fire in terms of integrity and smoke or fume emissions, the systems have been extensively tested in various modes in both our in-house facilities as well as at external fire laboratories.

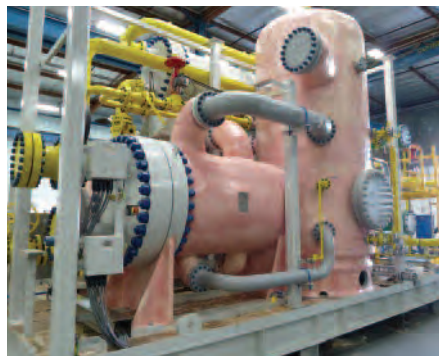
ContraFlame® JF120 system has been exposed to the jet fire resistance test (ISO: 22899 OTI 95634), the most aggressive and demanding fire scenario, at the HSE laboratory facility in Buxton and at GL Noble Denton's facility in Spadeadam.

### Jet Fire Performance

ContraFlame® JF120 system has been tested for jet fire resistance for both planar and tubular steel structures and has been certified by both Lloyds Register, DNV and ABS.

The main function of jet fire passive fire protection, such as ContraFlame® JF120, in fire conditions is to prevent the tensile strength of the substrate material from falling below the design stress as a result of elevated temperature. The permissible protection time provided by passive fire protection is limited by the temperature rise produced during the fire, superimposed on the operating temperature of the substrate at the start of the fire.

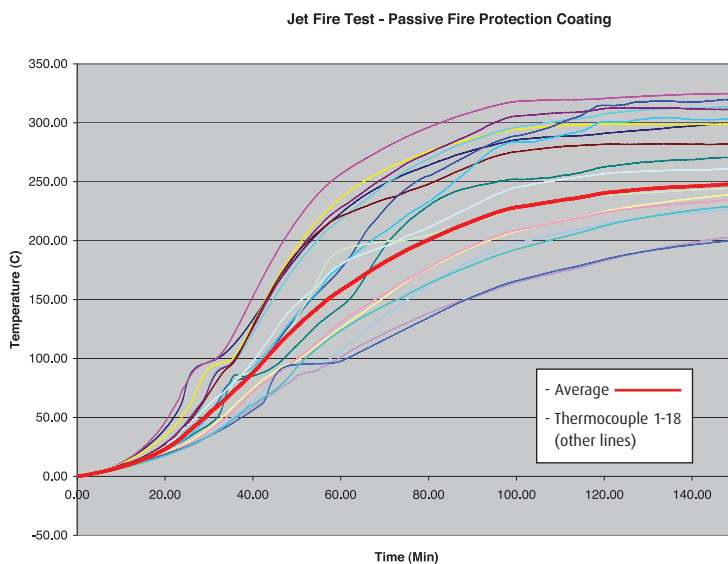
ContraFlame® JF120 has been successfully tested for 120 minutes on planar steel and for 90 minutes on tubular steel at a total application thickness of 34mm. In both tests the steel temperature remained well below the critical temperature of 400°C. Thickness of application can be reduced to meet specific levels of fire protection.



**ContraFlame® JF120 system provides robust jet fire protection for two hours.**

## Jet Fire Resistance

This represents the most demanding condition by simulating a closed vessel application. The test specimens in both cases also included a repair joint through the full thickness of the ContraFlame® JF120 system enabling certification of a system repair as well as the 'as new' condition.



The very low temperature rise associated with ContraFlame® JF120 system makes possible operating temperatures as high as 185°C whilst still assuring safe substrate temperature during the jet fire.

After the test, the ContraFlame® JF120 system was found to be substantially intact with the remaining char being at least 70% of the original system thickness. The D2004 topcoat remained as a protective skin over 95% of the surface of the test piece.



## Advantages of ContraFlame® JF120

- + Totally passive fire protection system
- + Thermal insulation for heat or cold conservation and / or personnel protection
- + Jointless corrosion barrier suitable for hostile environments
- + Extremely robust energy absorbing system
- + No metallic cladding system required
- + Water and vapour resistant
- + No structural supports required
- + Ambient curing
- + Simple application method
- + Low maintenance
- + Easily repairable at ambient or elevated process temperatures
- + Heat conservation performance not susceptible to impact damage
- + Easily removable for inspection and repair
- + Fire performance not affected by water
- + Low smoke and fumes in fire conditions
- + Wide service temperature range from -196°C to 185°C
- + Tolerance to extreme thermal shocks
- + Acoustic insulation

# ContraFlame® JF120 :

## Varied Applications

### Global support

#### Cost Savings

By using ContraFlame® JF120 it is possible to achieve significant overall project cost savings:

#### Blow down times

The extensive protection provided by ContraFlame® JF120 allows for blow down allowance times to be extended.

#### Layouts

The fire protection offered by ContraFlame® JF120 system provides the designer with a greater degree of freedom on layout with potential savings on pipework.

#### Lifetime Cost

ContraFlame® JF120 system provides seamless, high integrity corrosion protection reducing lifetime costs in hostile environments. The extremely robust nature of the system ensures low maintenance costs for the system and high resistance to accidental damage from adjacent operations.

#### Weight

The topsides weight can be significantly reduced by using ContraFlame® JF120 as the weight of ContraFlame® JF120 system is significantly lower than other available syntactic insulation / fire protection alternatives.

#### Thermal efficiency

The k value of ContraFlame® JF120 system is  $0.05\text{Wm}^{-1}\text{K}^{-1}$  which is equivalent to that of Rockwool or a cellular glass.

#### Experience

ContraFlame® JF120 and phenolic composite GRP have been successfully applied to hundreds of process packages requiring passive fire protection and heat conservation for offshore oil production in highly exposed situations.

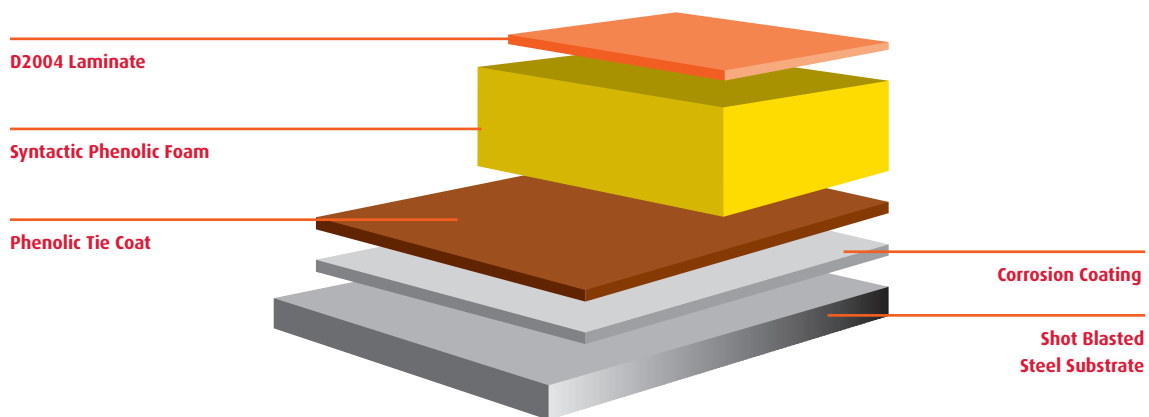
#### Supervision

Advanced Insulation provide training and supervision / inspection for each application.

Advanced Insulation also offers a complete supply and application service which provides the advantage of a clear, single point responsibility and improved technical and contractual liaison.



ContraFlame® JF120 is globally supported by our experienced technical and field support teams.



## Application

Each part of the ContraFlame® JF120 system is supplied as cold curing, in two part packs. The entire system is applied using simple trowel and roller techniques. The full ContraFlame® JF120 system consists of:

1. Shot-blast steel primed with a high performance two coat corrosion coating. ContraFlame® JF120 cannot be applied to thermally sprayed aluminium or any metal based corrosion coating systems.
2. ContraFlame® Tie Coat which provides a tacky interlayer to hold the syntactic foam and gives good bond integrity.
3. ContraFlame® C50 is normally applied in a single layer of 30mm.
4. ContraFlame® D2004, a phenolic composite top skin, nominally 3-5mm.
5. Decorative finish coat, e.g. single pack acrylic or epoxy.

Approved corrosion coating	2 pack epoxy phenolic <sup>1</sup>
Tie Coat Thickness	150-300µm
Top Coat Type / Thickness	ContraFlame® D2004 GRP / 3-5mm
Density <sup>2</sup> (cured)	C50 - 270-330 Kgm <sup>3</sup> D2004 - 1300kgm <sup>3</sup>
Maximum & minimum Operating Temp <sup>3</sup>	185°C to -196°C
Thermal Conductivity @ 25°C	C50 - 0.05 Wm <sup>-1</sup> K <sup>-1</sup> D2004 - 0.2Wm <sup>-1</sup> K <sup>-1</sup>
Specific Heat Capacity	1.5 Jg <sup>-1</sup> °C <sup>-1</sup>
Expansion Coefficient	C50 - 20.7 x 10 <sup>-6</sup> D2004 - 23.96 x 10 <sup>-6</sup>
Young's Modulus	C50 - 465 MPa D2004 - MPa
Tensile Strain to Failure	C50 - 1% D2004 - 1.65%
Tensile Strength	C50 - 5.15 MPa D2004 - 61.6 MPa
Shear Strength / Modulus	C50 - 0.76 MPa / 121 MPa
Compressive Strength (system)	18.3 MPa
Water Absorption	<1% by weight
Jet Fire Resistance <sup>4</sup>	J120
Blast Overpressure Resistance	4.2 Bar (unaffected)
Smoke Generation NES 711	8.71
Toxicity Index NES 713	1.41
Spread of Flame BS476 Pt7	Class 1
Limiting Oxygen Index	72%

<sup>1</sup> Please consult us prior to the application.

<sup>2</sup> Density may vary pending site conditions and application configuration.

<sup>3</sup> Can design bespoke systems for use at much higher temperatures.

<sup>4</sup> Thickness dependent.

Please note this information is based on our present state of knowledge and is intended to provide general notes on our products and their properties. It should not therefore be construed as guaranteeing specific properties of the products described or their suitability for a particular application. The values are subject to changes without notice, please consult with us prior to the application.



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We offer full technical support service for all our products regardless of location or application. For further information please contact us to discuss your requirements and/or request product trial reports.

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